2017 Winnebago System Sturgeon Spawning Assessment Summary Report

Ryan Koenigs, Winnebago Sturgeon Biologist

Introduction

The Lake Winnebago System is home to one of the nation's largest lake sturgeon populations (~43,000 adults), while also hosting the world's largest recreational fishery for the species. Each spring, mature lake sturgeon migrate up the Wolf, Embarrass, Little Wolf and upper Fox rivers to spawn. There are more than 60 known spawning sites within the Winnebago System, with the largest concentration of sites being located between New London and Shawano on the Wolf River. Some sites receive annual spawning activity, while others are only periodically used.

Pod of spawning lake sturgeon observed at a spawning site along the Wolf River (Photo Credit: Bob Rashid).

Each spring, the annual sturgeon spawning run receives extensive interest from the media and general public, particularly at publicly assessable sites like the Sturgeon Trail (New London), Bamboo Bend (Shiocton), and the Shawano Paper Mill Dam (Shawano). These sites provide the public with an opportunity to see hundreds of sturgeon spawning on rocky shorelines, literally at the feet of spectators. This is an opportunity that is unrivaled anywhere else in the world.

The annual lake sturgeon spawning run is also important to the DNR's management of the sturgeon population and fishery on the Winnebago System. DNR crews capture spawning fish and collect critical biological data to monitor trends within the population. The first spawning stock assessment was conducted in 1953, with annual assessments occurring from 1953-1964. Assessments were then discontinued for a decade before resuming again in 1975. There have been annual assessments every year since. Data collected during lake sturgeon stock assessments have provided managers with a better understanding of the factors that affect population trends. For example, by marking sturgeon with a tag and using subsequent recapture data biologists estimated that the average male lake sturgeon spawns every 2 years, while the average female spawns every 4 years. Historical mark-recapture data has also provided the framework to estimate population abundance and exploitation (harvest) rates during the annual spear fishery. Therefore, the spawning stock assessment has historically been, and continues to be, critical to effective management of the sturgeon population.

Primary assessment objectives are to: 1) mark fish for estimates of abundance and exploitation (harvest rates), 2) monitor size structure, 3) evaluate growth and mortality, 4) evaluate movement, and 5) determine river and spawning site fidelity of adult lake

sturgeon. This report focuses on data collected during the 2017 lake sturgeon spawning stock assessment conducted on the Winnebago System.

Methods

Typically, peak spawning occurs when water temperature are 52-58 degrees. In most years, spawning occurs somewhere between April 10 and May 5. The average spawning run lasts only 7 days, but duration is heavily impacted by weather (cooler temperatures lead to longer spawning runs; conversely warm temperatures result in a more condensed run). DNR fisheries staff work the duration of the spawning run, with an overall goal to handle as many fish as possible.

During the assessment, spawning lake sturgeon are captured along shore using large dip nets. Typically, 2-3 dippers work together to corral fish. All captured fish are measured to the nearest 0.1" (total length, TL, measured to longest point of the caudal fin). Sex and spawning stage (green, ripe, and spent) is determined for each fish based on extrusion of gametes (eggs or milt). The last step is to inspect each fish for external (Monel) and internal (PIT; passive integrated transponder) tags. PIT tags are located near the head of the fish and require scanning with a PIT reader to detect whether a tag is present or not. Tag number is documented for each recaptured fish, and PIT tags are inserted into all unmarked fish. All fish are then released at the capture location.

Photos of the netting (top) and marking of lake sturgeon with PIT tags (lower). PIT tags are inserted via syringe just behind the skull plate.

NOTE: Monel tags were used to mark fish with unique identification numbers for much of the 1950s through 2002, but internal PIT (passive integrated transponders) tags have been used to mark fish since 1999. Fish were marked with both tag types from 1999-2002, but tagging with Monel tags ceased midway through 2002 due to poor observed retention rates of Monel tags relative to PIT tags.

Results and Discussion

The 2017 sturgeon spawning run on the upper Fox River commenced on April 11 and lasted roughly a week. Over the course of three sampling days, our DNR crews

captured and handled 23 fish at a spawning site in downtown Princeton and 3 fish below the Eureka Dam. In addition to the 26 fish captured while spawning, we also used electro-fishing to capture 28 fish (11 in Princeton and 17 in Berlin) on April 10. Capturing sturgeon using traditional dip netting methods has always been problematic for collecting sturgeon from the upper Fox River as the run is much smaller than the run on the Wolf River and the fish usually spook easily. 2017 marked the 2nd spring where DNR crews shocked the shorelines of known spawning sites prior to the onset of spawning. This has shown to be a very effective method for capturing sturgeon from the upper Fox River. In one day of sampling, more sturgeon were handled than in 3 days of sampling using traditional dip netting techniques.

The DNR has been working on a collaborative project with Sturgeon for Tomorrow and the School of Freshwater Sciences at the University of Wisconsin Milwaukee to augment the sturgeon population and spawning run on the upper Fox River since 2002. Stocking has been the primary tool utilized to date with 30,477 larvae, 9,265 fingerlings, 2,317 yearlings, and 43 age-2 and older sturgeon stocked in the upper Fox River since 2002. Most of the fish have been stocked in the Fox River at either Princeton or Montello, but there have also been fish stocked in Berlin and Germania (Mecan River) over the years. Fish stocked as fingerling or older were marked with PIT tags prior to release to assess survival, movement, recruitment and spawning location(s) used once sexual maturity is reached. The first year class stocked was from 2001 (age-16), therefore the males from the earlier year classes should be starting to reach maturity (males reach maturity between 14-20 years of age on the Winnebago System). Stocked fish have been contributing to the spear fishery in recent seasons, but we had yet to handle a stocked fish during spawning stock assessments prior to 2017. We captured the first stocked male on a spawning run in Princeton on April 10, 2017. The fish was stocked in 2002 as an 11.3" yearling and recaptured at age 15 and 48.5".

Sturgeon tagging crew with a 77.0" female lake sturgeon captured below the Shawano Dam on April 20, 2017. This was the 4th longest fish captured during the 2017 spawning stock assessment.

Lake sturgeon spawning on the Wolf River began on April 17, 2017 and was all wrapped up by April 21. Thus, the run only lasted 5 days, marking one of the shorter runs on record. Despite the short run, DNR crews handled 1,775 fish in the Wolf River watershed. Most of the fish (1,747) were handled from the Wolf River, but there were also 28 fish captured from the Embarrass River. Like most springs, the largest number of fish were handled at the Shawano Dam (942), the Pines

(229), Bamboo Bend (194), and the Sturgeon Trail (192). These sites receive annual spawning activity and are the top locations for tagging efforts year after year. Three of these sites (Shawano Dam, Bamboo Bend and the Sturgeon Trail) are publicly accessible, which provides fantastic opportunity for spectators to view sturgeon spawning and sturgeon tagging operations.

Of the 1,829 lake sturgeon handled during 2017 stock assessments, 224 were females and 1,605 were males. The skewed sex ratio of male to female sturgeon observed during the assessment was anticipated. Males reach maturity at younger ages (14-20 years of age for males vs. 20-30 years for females) and have a shorter periodicity between spawning migrations (every 1-2 years for males vs. 3-5 years for females) than females. Males also will be vulnerable to our capture gear anytime that a female is ovulating, whereas females are only in the shallow near-shore areas for the 8-12 hours that they are actively ovulating. Lastly, comes from the bias of our dippers who are targeting males and trained not to disturb the females. Multiple males will be spawning at any given time with a single female. The entire spawning pod will vanish shortly after the female leaves the shoreline, regardless if from being netted or spooked. Therefore, our dippers usually attempt to net at least a few males out of the pod before trying to capture the female.

The mean length of male lake sturgeon handled during the 2017 spawning stock assessment was 56.7" (range 34.6-72.3"), while the average length of females was 66.0" (range 52.8-81.0") (Figure 1). Males ranging from 52-62" accounted for 61.4% of the male sturgeon handled, while females ranging from 62-70" were most frequently handled

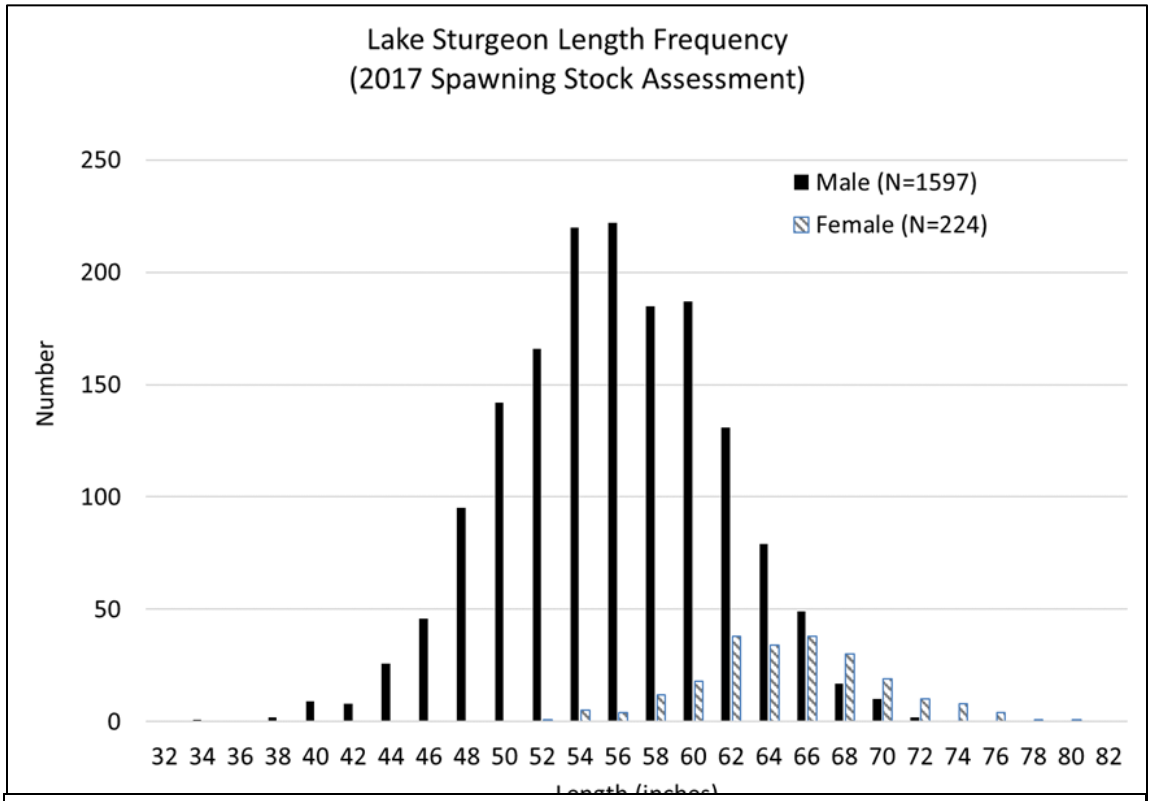

Figure 1. Size distribution of male and female lake sturgeon captured during the 2017 spawning stock assessments conducted on the Winnebago System.

(62.5%). Lake sturgeon larger than 70" are often considered trophies and there was a strong contribution (19.2%) of trophy females within the sample.

We are routinely asked what percentage of fish already have been marked with PIT tags. As I stated earlier, PIT tags have been used to mark fish since 1999 and have much greater retention than Monel tags. In 2017, 50.7% of the males handled had already been PIT tagged, while only 21.1% of the females had previously been tagged. The higher recapture rate for males is due to the sexually bias capture rate explained previously.

The lake sturgeon spawning run on the Winnebago System is also a crucial time for multiple lake sturgeon rehabilitation programs, as the Wolf River serves as a brood source. Our DNR crew was able to meet the stocking goals for lake sturgeon restoration efforts within Lake Michigan (streamside rearing facilities on the Milwaukee and Kewaunee Rivers) and the Tennessee River watershed (fish being stocked into Georgia, Tennessee and Kentucky). Eggs were also collected and fertilized for the Genoa National Fish Hatchery in La Crosse, WI.

Data collected from fish handled during the spawning assessments are critical to managing the Winnebago System lake sturgeon population and spear fishery. Without marking fish in the spring we would not be able to estimate abundance, and in turn set safe harvest limits. We are fortunate that this assessment, along with all other sturgeon related assessment and research, is funded by revenue generated from the sale of sturgeon spearing licenses. Thank you to everyone that purchases a license and contributes to the Winnebago System lake sturgeon assessment program.

I hope you found the report interesting and informative Feel free to contact me by email (Ryan.koenigs@wisconsin.gov) or phone (920-303-5450) if you have any questions related to fisheries management on the Winnebago System.

Ryan Koenigs

Ryan Koenigs
Winnebago Sturgeon Biologist